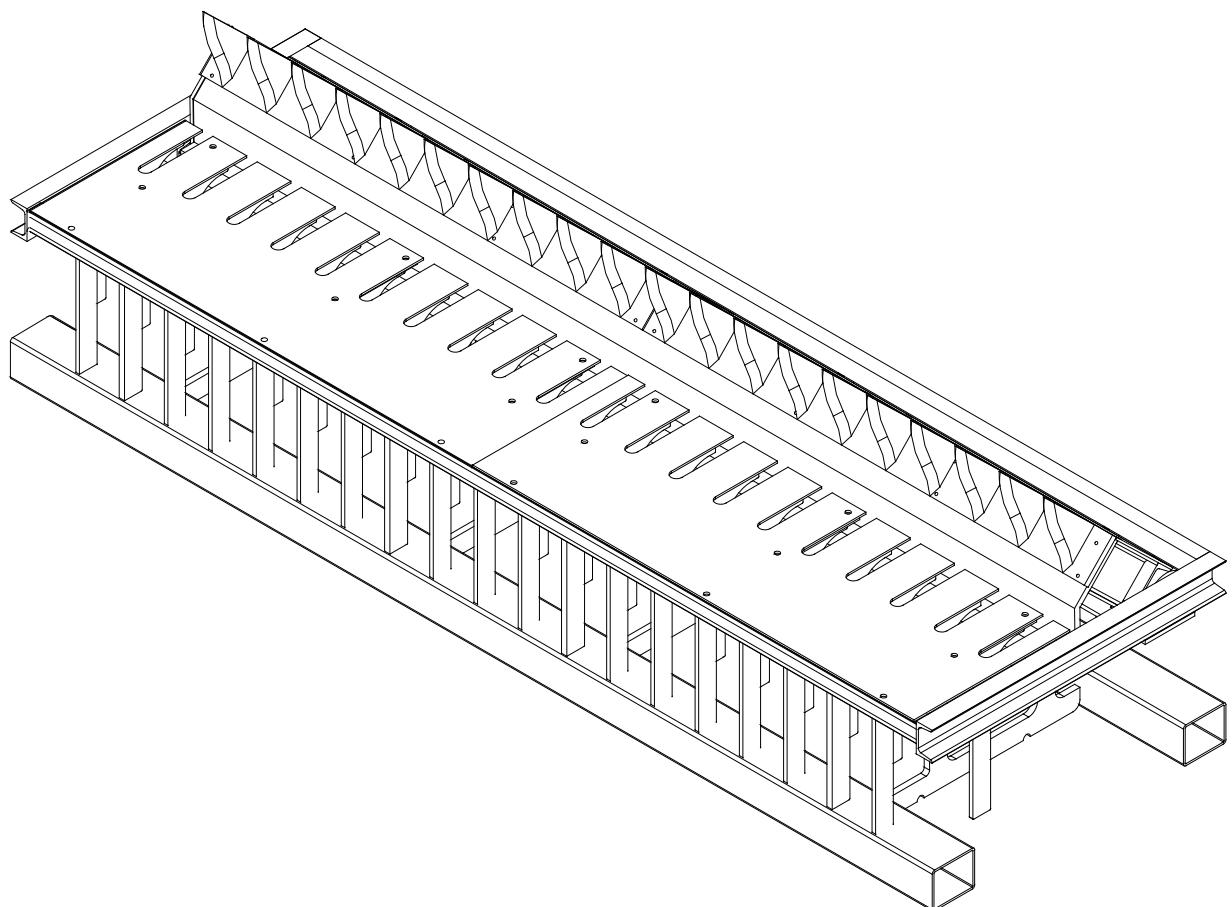




# Tyre-Killer TK

User manual, Version 1.4



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**® Pevac 04-2002**

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## Pevac Tyre-Killer TK

The Pevac Tyre-Killer TK is a special dynamic anti-terrorism blockade which is provided with specially hardened teeth. The Tyre-Killer TK is a high quality product for the highest degree of protection. In case of a collision, the special teeth penetrate and totally destroy both the tyres and the wheel rims of the unauthorised vehicle. The teeth can rise out of the road surface or sink back into it in only a few seconds.

The Tyre-Killer TK is hydraulically driven. The hydraulic drive is electrically operated. There are a great number of possibilities for operation, from simple, manual operation to advanced entry control systems.

## Declaration of agreement

The Tyre-Killer TK is accompanied by a manufacturer's declaration. With this, the product complies with the New Approach guidelines, which guarantees optimal safety. However, it's forbidden for people to come close to the Tyre-Killer TK, when raised or when operated. The manufacturer is never responsible for damage or personal injurie.

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## TABLE OF CONTENTS

<b>1</b>	<b>USE OF THE INSTALLATION MANUAL</b>	<b>7</b>	<b>8</b>	<b>INSTALLATION</b>	<b>15</b>
1.1	Related documentation	7		8.1 Installation preparation	15
1.2	Use according to destination	7		8.2 Installation conditions	15
				8.2.1 <i>Hydraulic drive unit in installation cabinet</i>	15
<b>2</b>	<b>SAFETY</b>	<b>8</b>		8.2.2 <i>Hydraulic drive unit in a separate room</i>	15
2.1	Safety and health risks	8		8.3 Materials to be used	15
2.2	Safety precautions of the Tyre-Killer TK	8		8.4 Pit in asphalt or concrete	16
2.3	Recommended environ- mental safety provisions	8		8.5 Pit in cobbled road	16
2.4	Safety precautions and maintenance	9		8.6 Placing the concrete base	16
				8.6.1 <i>Fixing the concrete base on site</i>	16
				8.6.2 <i>Fixing the pre-fabricated concrete base</i>	16
<b>3</b>	<b>GUARANTEE</b>	<b>10</b>		8.7 Sealing the pit	17
3.1	Liability	10		8.8 Placing the Tyre-Killer TK	17
				8.9 Fitting the jacket sleeves	17
				8.9.1 <i>For use of an installation cabinet</i>	17
<b>4</b>	<b>MACHINE DESCRIPTION</b>	<b>11</b>		8.9.2 <i>For use in a mechanical room</i>	17
4.1	Technical data	11		8.10 Installation of hoses and cables	17
4.2	Main components	11			
4.3	Product identification	12			
4.4	Principles of operation	12			
4.4.1	<i>Tyre-Killer TK</i>	12	<b>9</b>	<b>HYDRAULIC SYSTEM</b>	<b>18</b>
4.4.2	<i>Mechanical Lock (option)</i>	12		9.1 Hydraulic drive unit	18
<b>5</b>	<b>OPERATION AND USE</b>	<b>13</b>		9.2 Hydraulic drive unit, type HC-ML	18
<b>6</b>	<b>PERIODIC INSPECTION BY OWN PERSONAL</b>	<b>13</b>		9.3 Operation with the hand pump	21
<b>7</b>	<b>STORAGE AND TRANSPORT</b>	<b>14</b>	<b>10</b>	<b>ELECTRICAL INSTALLATION</b>	<b>21</b>
7.1	Storage of the Tyre-Killer TK	14		10.1 Hydraulic drive unit	21
7.2	Transport of the Tyre- Killer TK	14		10.2 Placing the Tyre-Killer TK	21
7.3	Transport of the concrete foundation	14		10.3 Cable diagram Tyre- Killer TK	22
				10.4 Electrical diagram Tyre- Killer TK	23

<b>11</b>	<b>CONNECTION OF THE TYRE-KILLER TK</b>	<b>24</b>
11.1	Electrical connections	24
11.2	Placing and connecting the controller box	24
11.3	Hydraulic connections	24
11.3.1	<i>Bleeding air from the hydraulic hoses of the lift</i>	24
11.3.2	<i>Bleeding air from the hydraulic hoses of the Mechanical Lock</i>	24
11.3.3	<i>Hydraulic connections Tyre-Killer TK</i>	25
11.3.4	<i>Hydraulic connections Mechanical Lock (option)</i>	25
<b>12</b>	<b>COMMISSIONING</b>	<b>26</b>
12.1	Function for switches	26
12.2	Preventing access	27
12.3	Permitting access	27
12.4	Checking the operation	27
12.5	Final assembly	27
<b>13</b>	<b>GENERAL INSPECTION AND MAINTENANCE</b>	<b>28</b>
13.1	Service intervals	28
<b>14</b>	<b>THE TYRE-KILLER TK AND THE ENVIRONMENT</b>	<b>28</b>
14.1	End of life span	28

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## 1 USE OF THE INSTALLATION MANUAL

This manual is intended for persons who are responsible for installing, operating and maintaining the Tyre-Killer TK. This manual describes how the Tyre-Killer TK can be safely installed, used and maintained.

Read the manual completely before installing or using the Tyre-Killer TK.

Keep this manual in the control room.

In this manual the following pictograms and symbols are used:



### Warning

Danger of injury to operator or bystanders, or danger of major damage to the Tyre-Killer TK or to other objects. Follow the instructions carefully.



### Danger

Life threatening danger or danger of serious injury. Follow the instructions carefully.



### Note

Tip to make work easier.



### Environment

Remark regarding the environmental impact of the Tyre-Killer TK in operation and of the Tyre-Killer TK should be disposed of.



### • Action

Actions to be taken.

This manual has been drafted with the utmost care. Pevac B.V. is not liable for damage that occurs as a result of any inaccuracies in this manual. We request that you inform us, as a matter of urgency, of any inaccuracies you may find.

### 1.1 Related documentation

As well as this manual for the Tyre-Killer TK, there are also the following documents:

- Maintenance book Tyre-Killer TK.
- Log card.
- Hydraulic drawings.
- Controller drawings.

### 1.2 Use according to destination

The Tyre-Killer TK may NOT be used on a public road. In terrain's where the Tyre-Killer TK has been installed, a maximum speed of 30 km/hour must be observed.

The Tyre-Killer TK may not be used for moped riders, cyclists, motorcycle riders and pedestrians.

The Tyre-Killer TK can be used in the following situations:

Security of amongst others:

- Military bases;
- Banks;
- Financial institutions;
- Embassies;
- High security industrial area's.

Any other or extended use does not comply with the intended use. Use and install the Tyre-Killer TK only when it is in technically perfect condition.

## 2 SAFETY

In this chapter, the safety aspects of the Pevac Tyre-Killer TK are discussed.

Read this chapter thoroughly before use of the Tyre-Killer TK.

### 2.1 Safety and health risk

The Tyre-Killer TK has been safely constructed. At each installation in a certain environment, new risks can occur that can be different for each installation. The customer must carefully assess beforehand what risks can occur after the installation. In general the following risks can be distinguished:

- Collision with the Tyre-Killer TK due to bad visibility;
- Collision due to excessive speed;
- Possible injury to moped riders, cyclists, motorcycle riders and pedestrians because they are too close to the Tyre-Killer TK.

During the design of the Tyre-Killer TK, safety precautions were taken to reduce these risks as much as possible. By taking account of the above risks and by following the safety regulations, these risks are limited even more.

### 2.2 Safety precautions of the Tyre-Killer TK

To make the use of the Tyre-Killer TK as safe as possible, the following safety measures have been taken:

- A clear colour choice ensures good visibility of the Tyre-Killer TK;
- Accumulation of dirt can reduce the visibility of the Tyre-Killer TK. The accumulation of dirt will be limited due to the smooth surface of the Tyre-Killer TK;
- To prevent slipperiness of the Tyre-Killer TK in the sunken condition, as much as possible, the top plate is fitted with an anti-slip surface.

### 2.3 Recommended environmental safety provisions



#### Warning

Environmental measures must be taken for the safe use of the Tyre-Killer TK. The necessary measures will be different for each situation. In general the following measures will contribute to decreasing risks for road users.



#### Danger

The environment must be adapted in such a way that a high speed (higher than 30 km/hour) is hard to reach, for example by bumps in the road surface, an S-curve (with unobstructed view) in the road and maximum speed signs.



#### Danger

In order to ensure the safety of moped riders, cyclists, motorcycle riders and pedestrians, they must not be permitted in the vicinity of the Tyre-Killer TK. Establishing a danger zone with the help of traffic signs, text signs, pictograms, road markings and the physical separation of traffic flows can facilitate this.



#### Warning

Traffic lights, warning boards, and lighting should be placed in the vicinity to insure good visibility of the Tyre-Killer TK.



#### Danger

If a traffic light is to be utilised, the green light may only be given if the obstacle is in the lowest position: this indicates that the passage is completely unobstructed. The traffic light must change to red several seconds before the Tyre-Killer TK is raised in order to give road users sufficient time to stop. The traffic light must remain red while the Tyre-Killer TK is moving and while it is in the highest position.

### **Warning**



It is forbidden to stop or to park above the Tyre-Killer TK. Traffic signs can also indicate this.



### **Note**

It is advisable to make recordings with a security camera in the vicinity of the Tyre-Killer TK. This has the advantage of providing a record of a possible collision and allowing a determination of the possible cause. Furthermore, sabotage can be witnessed and recorded.

### **Warning**



The obstacle must not rise if vehicles are above the Tyre-Killer TK. To this end, detection systems such as detection loops in the road surface, photocells, or cameras can be used.

### **Warning**



Fault detection can be used. In the event of a fault, the traffic light must change to red and remain red. Additionally, in that case, a signal must be sent to the central control room.

## **2.4 Safety precautions and maintenance**

- Check the Tyre-Killer TK on every first working day of the week for proper functioning.
- Check the visibility of the Tyre-Killer TK every first working day. Remove dirt and replace the striping if it is damaged.
- Carry out maintenance in accordance with the specifications in the maintenance and repair logbook.
- During installation and maintenance work, the drive must be disengaged.
- The Tyre-Killer TK can only be operated by personnel who are adequately trained and familiar with the operation.

### 3 GUARANTEE

Guarantee is given according to the conditions stated in the "Conditions of the Metal Union". Pevac BV, however, gives a guarantee for a period of 24 months instead of 6 months, as stated in 14.1 of the conditions of the metal union. A copy of these conditions can be obtained from Pevac BV.

The Tyre-Killer TK has been manufactured with the utmost care. Therefore, Pevac BV gives the initial user a guarantee for 24 months, taken from the invoice date.

The guarantee implies that Pevac BV makes replacement parts available, free of charge, for all parts that show any shortcomings, within the term mentioned, due to imperfections of the material or manufacture.

Excluded from guarantee are all parts that should be replaced according to the maintenance schedule.

The guarantee concerns the replacement of defective parts, exclusive of installation, at the discretion of Pevac BV.

Pevac BV explicitly rejects all further claims for compensation of damage, of any nature. The guarantee does not apply for faults that have occurred due to injudicious, incorrect or careless handling, incorrect use, incorrect connection or connection by unqualified parties.

The guarantee expires if:

- Unauthorised parties have carried out repairs or maintenance to the installation;
- The installation was not used in accordance with the normal intended use or was used under abnormal circumstances;

- It cannot be shown that the installation was inspected by a qualified installer or service organisation in accordance with the maintenance schedule;
- The complaint is not immediately reported to a qualified installer or service organisation;
- Repairs are carried out without the prior permission of Pevac BV;
- Parts are replaced without prior permission from Pevac BV;
- Original parts are not used during repair;
- The damage was caused by use other than mentioned in § 1.2 "Use according to intended purpose";
- Claims do not take place within eight days after the complaint was discovered or reasonably should have been discovered.

The repair or replacement of parts during the period of guarantee does not result in the extension of this term. Replaced parts become property of Pevac BV.

If necessary, Pevac BV can require that the parts are shipped postage-paid to Pevac BV. Postage-paid return is made if the repair was carried out under guarantee.

Excluded from guarantee is all damage that has occurred to the Tyre-Killer TK by persons, vehicles, or adjacent moveable or immovable property.

#### 3.1 Liability

Pevac BV accepts no liability for damage or physical injury that occurs due to:

- Not following the instructions in this manual;
- Carelessness during the use, maintenance, repositioning, installing, dismantling or repair of the Tyre-Killer TK;
- Use that is not in compliance with the intended purpose.

## 4 MACHINE DESCRIPTION

The Tyre-Killer TK consists of a steel frame that is mounted in a pre-fabricated concrete foundation. In the concrete foundation are the connections for the conduits for cables and hoses and the drain tubes. These connections are on the hinged side of the Tyre-Killer TK. The obstacle with teeth and the cylinders are attached to the frame.

An obstacle is the blocking element of the Tyre-Killer TK. The obstacle is attached to the frame by hinges. In the highest position, the obstacle has a height of 280 mm above the surface.

### 4.1 Technical data

#### Sizes:

Type	Height	Width	Length
TK 2000	450 mm	830 mm	2100 mm
<b>TK 2500</b>	<b>450 mm</b>	<b>830 mm</b>	<b>2600 mm</b>
TK 3000	450 mm	830 mm	3100 mm
TK 3500	450 mm	830 mm	3600 mm
TK 4000	450 mm	830 mm	4100 mm
TK 4500	450 mm	830 mm	4600 mm
TK 5000	450 mm	830 mm	5100 mm
TK 5500	450 mm	830 mm	5600 mm
TK 6000	450 mm	830 mm	6100 mm
TK 6500	450 mm	830 mm	6600 mm
TK 7000	450 mm	830 mm	7100 mm
TK 7500	450 mm	830 mm	7600 mm
TK 8000	450 mm	830 mm	8100 mm

The height of the teeth is 280 mm above the surface in its upper position.

#### Weights:

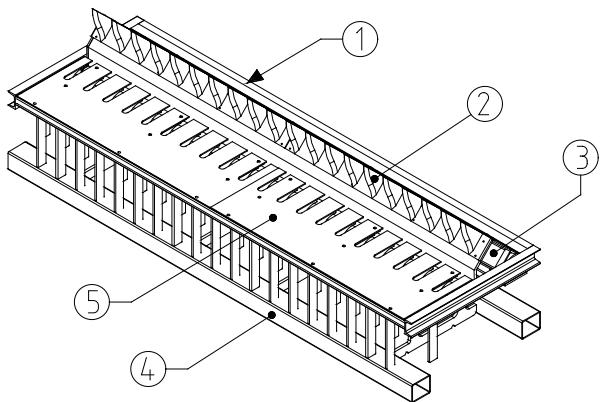
Type	Weight (incl. obstacle)
<b>TK 2000</b>	<b>575 kg</b>
TK 2500	700 kg
TK 3000	825 kg
TK 3500	950 kg
TK 4000	1075 kg
TK 4500	1200 kg
TK 5000	1325 kg
TK 5500	1450 kg
TK 6000	1575 kg
TK 6500	1750 kg
TK 7000	1875 kg
TK 7500	2000 kg
TK 8000	2150 kg

The Tyre-Killer TK has two hydraulic cylinders for raising and lowering and one hydraulic cylinder for locking the obstacle in the raised position. The following cylinders are used.

#### Hydraulic cylinders:

Name	Cylinder type	Volume bottom side	Volume piston side
Lifting	30/20 - 250 mm	354 cc	197 cc
Locking	25/15 - 40 mm	19.6 cc	15.1 cc

### 4.2 Main components

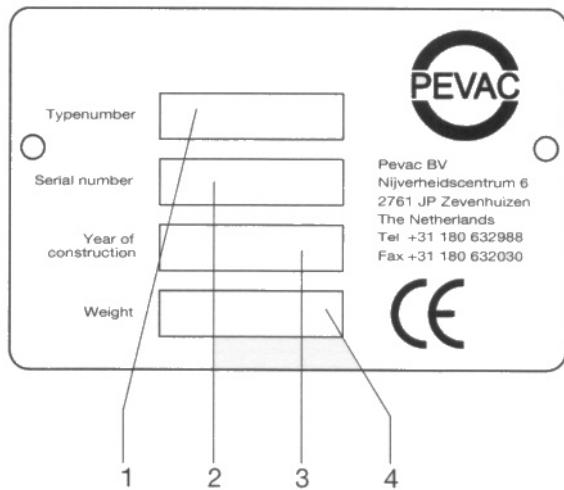


The Tyre-Killer TK consists of the following components:

1. Top plate Obstacle.
2. Teeth.
3. Obstacle.
4. Frame.
5. Top plate Frame.

## 4.3 Product identification

The type plate (fig. 4.3) contains the following data:



1. Type number
2. Serial number
3. Year of construction
4. Weight

## 4.4 Principles of operation

### 4.4.1 Tyre-Killer TK

According to the “quickly up, quickly down” principle, a steel obstacle can be moved that provides a dynamic blockade of the terrain. This obstacle is moved upward with hydraulic cylinders to block a passage and moved downward to make the passage free.

The teeth of the Tyre-Killer TK are pointing towards the attack side. There are two proximity switches mounted in the frame of the Tyre-Killer TK.

With the help of these switches, the two end positions of the obstacle can be determined or a fault detected. The Tyre-Killer TK can be, depending on the controller used, manually or automatically operated.

### 4.4.2 Mechanical Lock (option)

The Tyre-Killer TK can be equipped with a Mechanical Lock (ML). This ML is a mechanical lock that locks the obstacle on the Tyre-Killer TK in the highest position. In this way, the Tyre-Killer TK cannot be lowered even if the hydraulic pressure is completely diminished, in the case of sabotage for instance. The mechanical lock is operated with a hydraulic cylinder. The position of the mechanical lock is detected through the use of two proximity switches.

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## 5 OPERATION AND USE

Depending on the manner in which the Tyre-Killer TK is installed, a separate user manual for operation may be applicable. See the user manual included with the controller system.

## 6 PERIODIC INSPECTION BY OWN PERSONAL

To guarantee the safety and the proper functioning of the Tyre-Killer TK maintenance is necessary.

Every week the following actions must be taken:

- Check the Tyre-Killer TK for correct functioning.
- Check the visibility of the Tyre-Killer TK.
- Remove dirt from the Tyre-Killer TK.
- Check that no water remains in the Tyre-Killer TK.

## 7 STORAGE AND TRANSPORT



### Warning

Ensure that for lifting work, the strength of the hoisting belts or chains can handle the weight to be hoisted.



### Warning

Ensure that the Tyre-Killer TK hangs completely horizontally and in balance during hoisting.

### 7.1 Storage of the Tyre-Killer TK

When storing the Tyre-Killer TK, attention should be paid to the following points:

- Place the Tyre-Killer TK on a flat and stable surface.
- Protect the Tyre-Killer TK from dirt and moisture.
- Prevent damage to the zinc coating by placing the Tyre-Killer TK on a wooden surface.

### 7.2 Transport of the Tyre-Killer TK



### Note

For the weight of the Tyre-Killer TK, see the technical specifications, § 4.1.



### Warning

Prevent damage to the powder coating and the zinc layer during transport.

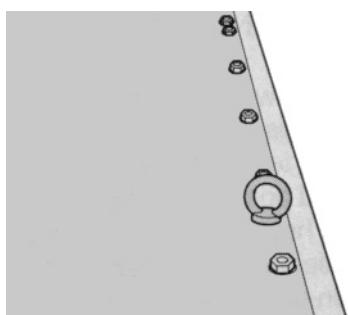


### Warning

Position the Tyre-Killer TK on a wooden surface.

Order of working when transporting the Tyre-Killer TK:

- Screw the 4 hoisting eyes into the intended locations



- Hoist the Tyre-Killer TK with four hoisting belts or chains on the truck.
- Place the Tyre-Killer TK horizontally on the loading platform, so that the obstacle is on the top.
- Fasten the Tyre-Killer TK firmly on the truck, so that it cannot slide in any direction during transportation.

The same directions apply for unloading as for loading.

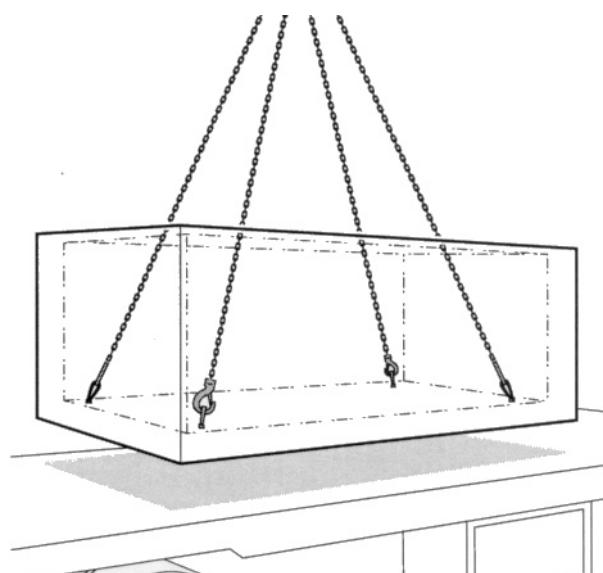
### 7.3 Transport of the concrete foundation



For the weight of the concrete foundation, see the technical specifications, § 4.1.

Sequence of working during transport of the concrete foundation:

- Screw the 4 crane hooks or hoisting loops into the screw sleeves that are poured in the bottom of the concrete foundation.
- Install the hoisting belts or chains on the crane hooks or hoisting loops.
- Hoist the concrete foundation onto the loading platform
- Make sure that the foundation is securely attached to the loading platform.



The same guidelines apply to unloading as to loading.

## 8 INSTALLATION

### 8.1 Installation preparation



#### Note

The hydraulic drive unit must be installed within a radius of 15 m from the Tyre-Killer TK.

For successful installation you should prepare yourself as follows:



#### Danger

During the installation (and also during other work on the Tyre-Killer TK), the power supply of the installation must always be switched off.

### 8.2 Installation conditions



#### Warning

The Tyre-Killer TK can only be installed, inspected, maintained and/or repaired by personnel who are qualified by Pevac BV.

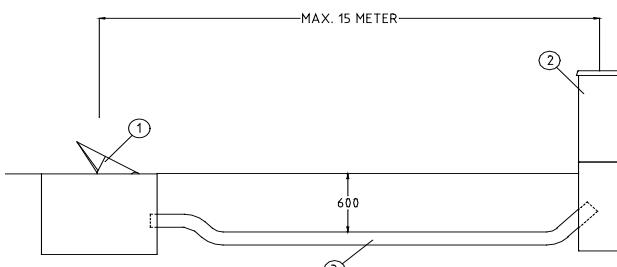
At the place of installation, the necessary control cables and hoses must be present.

Depending on the road surface in which the Tyre-Killer TK must be installed, it will be necessary, in accordance with the installation, to make a pit and a trench in the road surface in:

- Asphalt hardening (see § 8.4), or
- Cobbled road (see § 8.5).

### 8.2.1 Hydraulic drive unit in installation cabinet

The hydraulic drive unit can be placed, together with the controls, in an installation cabinet. A jacket sleeve for the cables and hoses must be laid from the installation cabinet to the Tyre-Killer TK.



1. Tyre-Killer TK
2. Installation cabinet with controller and hydraulic drive
3. Jacket sleeve for feed-through of the cables and hoses

### 8.2.2 Hydraulic drive unit in a separate room

If the hydraulic drive unit is to be installed in a separate mechanical room, together with the controller, a jacket sleeve for the drive unit and the controller must be laid from this area to the Tyre-Killer TK.

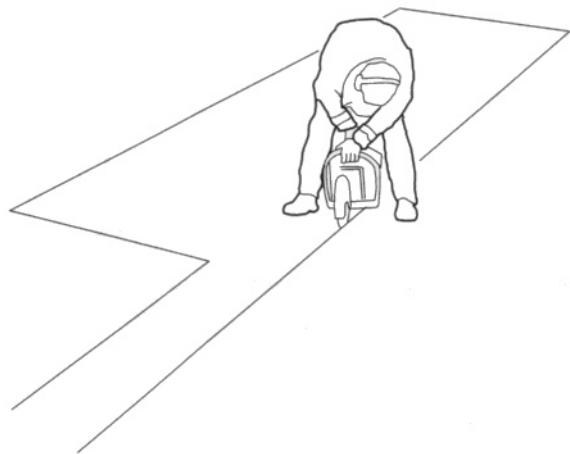
### 8.3 Materials to be used

For positioning the Tyre-Killer TK, the following equipment / tools are necessary:

- Crane truck.
- Hoisting belts or chains.
- Diamond saw (only for asphalt or concrete hardening).
- Gravel.
- Concrete.
- PVC jacket sleeve with connectors ( $\varnothing$  100 mm or  $\varnothing$  125 mm) for the hydraulic hoses and the electrical cable.
- Pull cord, to pull the cables and hoses through the jacket sleeve.
- PVC drain tube with sleeves ( $\varnothing$  100 mm or  $\varnothing$  125 mm) for the drainage of rainwater (if connection to the sewer is possible).
- Electrical connection (in the control room) with main switch.
- PUR foam (only to be used if the hydraulic drive unit is to be placed in a separate mechanical room).

## 8.4 Pit in asphalt or concrete

- Mark off the location on the road surface where the Tyre-Killer TK should be positioned and where the jacket sleeve must be placed. The sizes of the pit and the groove for the jacket sleeve are given in the following tables.
- Cut into the asphalt a few centimetres with a diamond saw.



- Dig away the asphalt in front of the Tyre-Killer TK as well as in front of the jacket sleeve.
- Dig the pit for the Tyre-Killer TK and the groove for the jacket sleeve sufficiently deep.

### Pit sizes:

Type	Depth	Width	Length
TK 2000	650 - 700 mm	1500 mm	2800 mm
TK 2500	650 - 700 mm	1500 mm	3300 mm
TK 3000	650 - 700 mm	1500 mm	3800 mm
TK 3500	650 - 700 mm	1500 mm	4300 mm
TK 4000	650 - 700 mm	1500 mm	4800 mm
TK 4500	650 - 700 mm	1500 mm	5300 mm
TK 5000	650 - 700 mm	1500 mm	5800 mm
TK 5500	650 - 700 mm	1500 mm	6300 mm
TK 6000	650 - 700 mm	1500 mm	6800 mm
TK 6500	650 - 700 mm	1500 mm	7300 mm
TK 7000	650 - 700 mm	1500 mm	7800 mm
TK 7500	650 - 700 mm	1500 mm	8300 mm
TK 8000	650 - 700 mm	1500 mm	8800 mm

### Grove sizes:

Depth	Width
700 - 800 mm	250 mm

The length of the groove depends on the distance between the pit and the control room. The maximum distance is 15 m.

## 8.5 Pit in cobbled road

- Mark off the location on the road surface where the Tyre-Killer TK should be positioned and where the jacket sleeve must be placed.
- Remove the cobbles at that location.
- Dig the pit for the Tyre-Killer TK and the groove for the jacket sleeve sufficiently deep.

## 8.6 Placing the concrete base

### 8.6.1 Fixing the concrete base on site

- Make a wooden base as shown on the drawing of the concrete base. Make sure that the wooden base is completely levelled and that the top is levelled with the road surface.
- Put reinforcement in the wooden base as shown on the drawing of the concrete base.
- Make the proper openings for the bolts and put the inserts in place.
- Make the proper openings for connecting the conduits and drainage pipes, and put the connectors for the conduit in place.
- Fill the wooden base with concrete according the specifications of the concrete base construction company.
- If the concrete is completely hardened, remove the wooden shelf from the pit and clean the pit.

## 8.6.2 Fixing a pre-fabricated concrete base



### Warning

Ensure that for lifting work, the strength of the hoisting belts or chains can handle the weight to be hoisted.

- Flatten out the bottom of the pit.
- Position the concrete base in the pit so that:
  - It is completely levelled.
  - The top rim is levelled with the road surface.

## 8.7 Sealing the pit

- Fill up the space surrounding the concrete base with sand and seal it properly.
- Fill up the remaining space with glass-fibre reinforced concrete, in accordance with the concrete supplier's specifications.
- In the case of a cobblestone road, cover the opening above the concrete with previously removed cobblestones.



### Note

Put the cobblestones in the concrete. Do not use sand under the cobblestones.

## 8.8 Placing the Tyre-Killer TK

- Position the Tyre-Killer TK, inside the concrete base on the hoisting gin, in the pit so that:
  - It is completely level.
  - The top rim is level with the road surface.
- Remove the hoisting eyes from the Tyre-Killer TK.



### Warning

The attack side (this is the teeth side of the Tyre-Killer TK) must be positioned on the correct side.



### Warning

Do not use 90° bends in the corners of the jacket sleeve for the feed-through of the hydraulic hoses.

## 8.9 Fitting the jacket sleeves

### 8.9.1 For use of an installation cabinet

- Put the jacket sleeve in the groove and connect one end to the connector that's inserted in the centre of the concrete base.
- Connect the other end of the conduit in the wall feed-through in the base of the installation cabinet.
- Feed the pull cord through the jacket sleeve.
- Fit the drain tube for rain water drainage and connect it to the sewer at the other end (if appropriate).

### 8.9.2 For use in a mechanical room

- Create a feed-through from the mechanical room with a diameter of 125 mm, at an angle of 45°, so that this ends up on the outside, below the surface.
- Put the supplied jacket sleeve in the groove, pass one end in the connector that's in the centre of the concrete base and the other end in the wall feed-through, to a position about 10 cm under the floor surface.
- Feed the pull cord through the jacket sleeve.
- Fit the drain tube for rain water drainage and connect it to the sewer at the other end (if appropriate).

## 8.10 Installation of hoses and cables

- Remove the cover plates (deck plates) of the Tyre-Killer TK.
- Pull the hydraulic hoses and the electrical cable through the jacket sleeve. Use the pull cord in the jacket sleeve for this purpose.
  - Be certain that the hydraulic hoses in the Tyre-Killer TK are sufficiently long.
  - Be certain that the cable in the Tyre-Killer is sufficiently long.



### Note

Be certain that there are no kinks in the hydraulic hoses or the cable.

## 9 HYDRAULIC SYSTEM

### 9.1 Hydraulic drive unit

A hydraulic drive unit is necessary to drive the Tyre-Killer TK. For good, reliable operation of the Tyre-Killer TK, it is necessary to use a hydraulic unit that meets the following minimum specifications:

Minimum working pressure	Maximum working pressure	Pump capacity	Tank capacity
70 bar	110 bar	7.8 cc	4 litre

For operation of the Tyre-Killer TK, the unit must be equipped with electrically operated hydraulic valves for:

1. Raising and lowering the obstacle;
2. Extension and retraction of the mechanical lock.

For operation of the hydraulic drive unit see the manufacturer's directions.

#### Hydraulic unit HC-078 ML:

Pump capacity	Voltage	Motor power	Rise and fall time
7.8 cc/ revolution	380 V (3 phase)	2.2 kW	1.9 sec

#### 4/3 valve (back and forth):

Flow rate	Voltage	Power	Maximum working pressure
50 l/min	230 VAC	28 W	250 bar

### 9.2 Hydraulic drive unit, type HC-ML

The diagram on the next page shows the hydraulic system of the unit HC-ML. In the drawing, component locations are indicated with labels:

1. In the Tyre-Killer TK.
2. In the hydraulic drive unit.

Some of the components shown in the hydraulic diagram for the HC-ML unit are mounted on the hydraulic drive unit. The following table shows which components are located on the hydraulic drive unit.

With the hydraulic drive unit, type HC-ML, the obstacle can be lowered and raised, and the obstacle is locked in the highest position with the mechanical lock.

#### Obstacle down:

If the controller gives the command 'obstacle down', the gear pump (H) begins to turn, through which the hydraulic oil becomes pressurized. As a result, the 4/3 valve (T) of the mechanical lock is operated, through which the obstacle is unlocked. If the lock is moved, the sensor detects this condition. Thereafter, the 4/3 valve for the mechanical lock is deactivated. Then the 4/3 valve for the lift cylinders is operated, through which the top side (or rod side) of the cylinders (Q) comes under pressure and the cylinders are driven downward. As a result, the return valve is brought under pressure, through which it is opened, so that the oil under the cylinders can flow back to the reservoir. Once the obstacle has moved completely downward, a sensor detects this condition and the 4/3 valve for the lift cylinders switches the gear pump off. The 4/3 valve for the lift cylinders returns to the rest position.

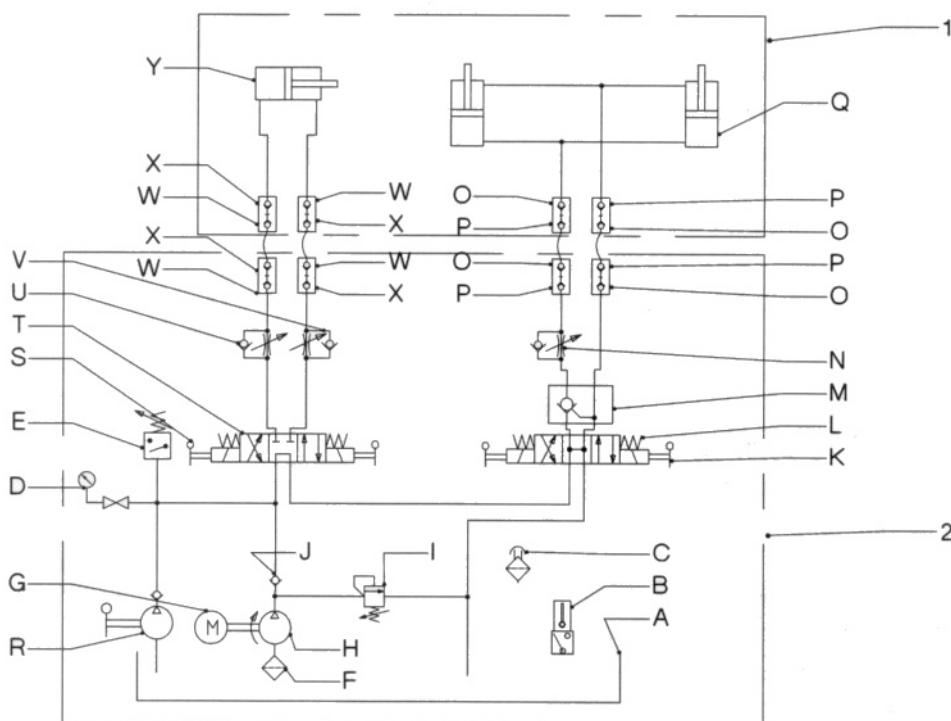
#### Obstacle up:

If the controller gives the command 'obstacle up', the gear pump (H) begins to turn, through which the hydraulic oil comes under pressure. As a result, the 4/3 valve (K) is operated, through which the under side (or bottom side) of the cylinders (Q) comes under pressure, and the obstacle is raised.

The oil on the top side of the cylinders flows freely back to the reservoir.

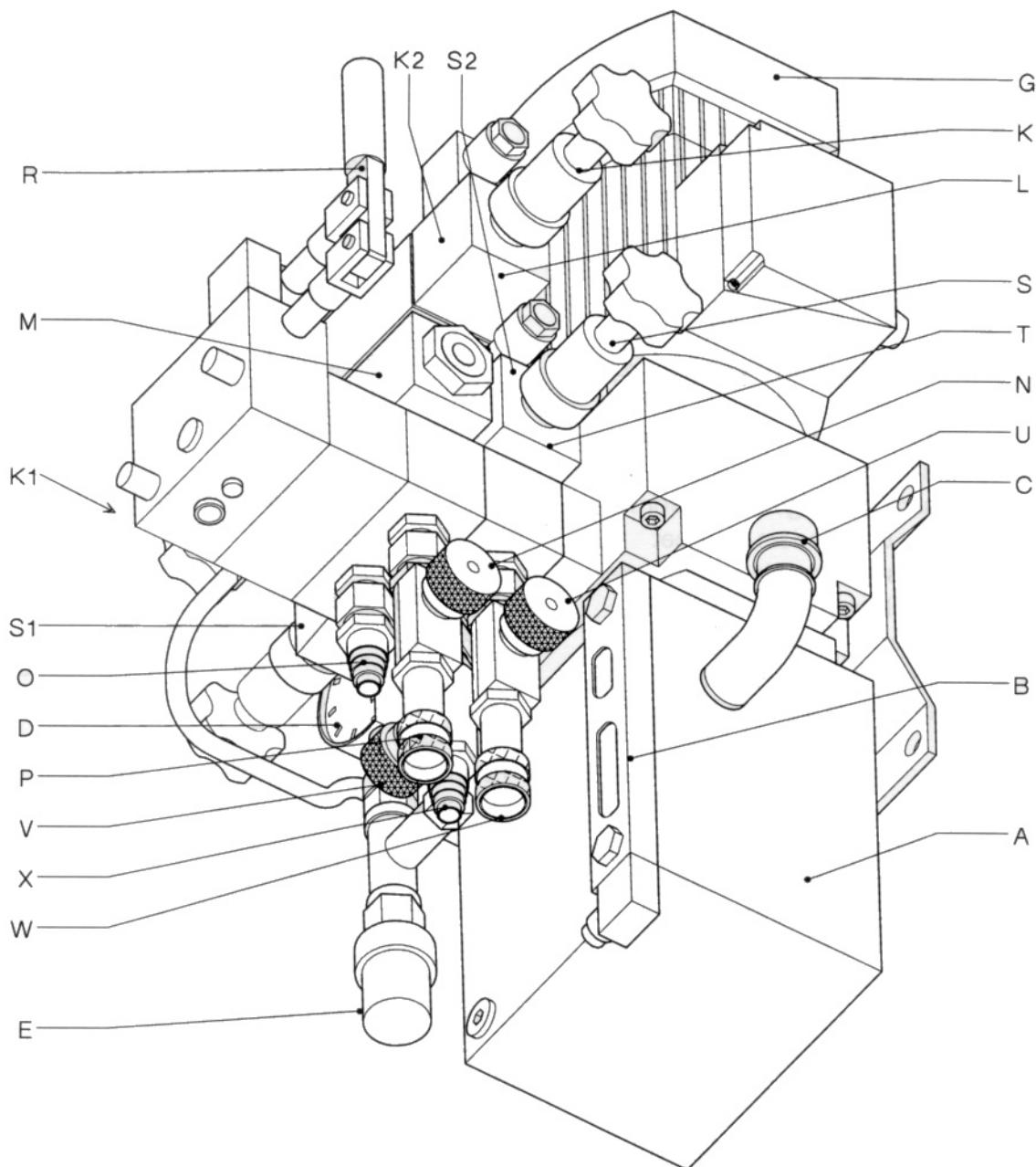
Once the obstacle has moved upward, a sensor detects this condition and switches the 4/3 valve off. Thereafter, the 4/3 valve for the mechanical lock is activated, through which the corresponding cylinder (Y) comes under pressure and the lock extends.

A sensor detects this condition and switches the gear pump off. The 4/3 valve for the mechanical lock is deactivated and returns to the rest position. The hydraulic return valve (M) prevents the obstacle from sinking downward through its own weight or the leakage of oil.



Position Diagram	Unit	Position	Description	Associated with
A	A	Oil tank		
B	B	Tank level indicator with level switch		
C	C	Fill cap with filter		
D	D	Manometer with manometer valve		
E	E	Pressure switch		
F	-	Suction filter		
G	G	Electric motor (3 phase)		Hydraulic pump drive
H	-	Gear pump		
I	-	Over-pressure valve (set at 100 bar)		
J	-	Return valve		
K	K	Manual control for 4/3 valve		Lift cylinders
L	L	4/3 valve (electrically operated / spring return)		Lift cylinders
M	M	Return valve (hydraulically operated)		Lift cylinders
N	N	Throttle needle		Lift cylinders
O	O	Quick coupler: male		Lift cylinders
P	P	Quick coupler: female		Lift cylinders
Q	-	Hydraulic cylinder		Hoisting obstacle
R	R	Hand pump		
S	S	Manual control for 4/3 valve		Mechanical lock
T	T	4/3 valve (electrically operated / spring return)		Mechanical lock
U	U	Throttle needle		Mechanical lock
V	V	Throttle needle		Mechanical lock
W	W	Quick coupler: female		Mechanical lock
X	X	Quick coupler: male		Mechanical lock
Y	-	Hydraulic cylinder		Mechanical lock

Valve spool	Function
K1	Obstacle up
K2	Obstacle down
S1	Mechanical lock Unlocked
S2	Mechanical lock Locked



**Throttle needle functions:**

Position	Description
N	Regulating lowering speed of obstacle
U	Regulating unlocking speed
V	Regulating locking speed



**Notes:**

- The rise speed of the obstacle should be approximately equal to the lowering speed.
- The locking speed should be approximately equal to the unlocking speed.

### 9.3 Operation with the hand pump:

In the event of mains power failure, the operation of the Tyre-Killer TK can be entirely performed with the hand pump, in which case both 4/3 valves must be manually operated.

The location of the hand pump on the hydraulic drive unit is shown in fig. 9.6.

#### Obstacle down:

1. Set the 4/3 valve for the unlocking of the mechanical lock in the correct position.
2. Pressurise the oil with the hand pump until the obstacle is unlocked.
3. Return the 4/3 valve to the rest position (stop operating).
4. Set the 4/3 valve for the lowering of the obstacle in the correct position.
5. Pressurise the oil with the hand pump until the obstacle is lowered.
6. Return the 4/3 valve to the rest position (stop operating).

#### Obstacle up:

1. Set the 4/3 valve for the raising of the obstacle in the correct position.
2. Pressurise the oil with the hand pump until the obstacle is raised.
3. Return the 4/3 valve to the rest position (stop operating).
4. Manually set the 4/3 valve for the locking of the obstacle in the correct position.
5. Pressurise the oil with the hand pump until the obstacle is locked.
6. Return the 4/3 valve to the rest position (stop operating).

## 10 ELECTRICAL INSTALLATION

The Tyre-Killer TK is hydraulically driven. The hydraulic drive is electrically operated.

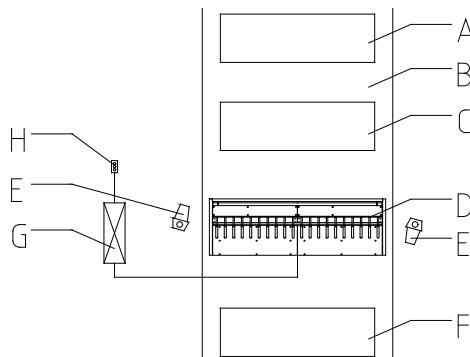
### 10.1 Hydraulic drive unit

The hydraulic drive unit consists of the following electrical components:

- Electric motor (3 phase)
- Level switch
- 4/3 valve for lift cylinders
- 4/3 valve for mechanical locking (option)
- Pressure switch

### 10.2 Placing Tyre-Killer TK

The figure below shows a standard situation in which a Tyre-Killer TK can be put into service. In this situation, the Tyre-Killer TK is suitable for two-way traffic. Traffic lights are also used in this situation. The installation can, in most situations, be adapted as desired.



Pos.	Description	Function
A.	Open detection loop.	Automatic ride-out.
B.	Driveway.	
C.	Safety detection loop.	Automatic closing of the passage.
D.	Tyre-Killer TK	
E.	Traffic light	Warning if the Tyre-Killer TK is raised: Ride-through is not possible!
F.	Safety detection loop.	Automatic closing of the passage.
G.	Installation cabinet with controller and hydraulic drive unit.	Control of the Tyre-Killer TK.
H.	Push-button console	Operation of the Tyre-Killer TK.

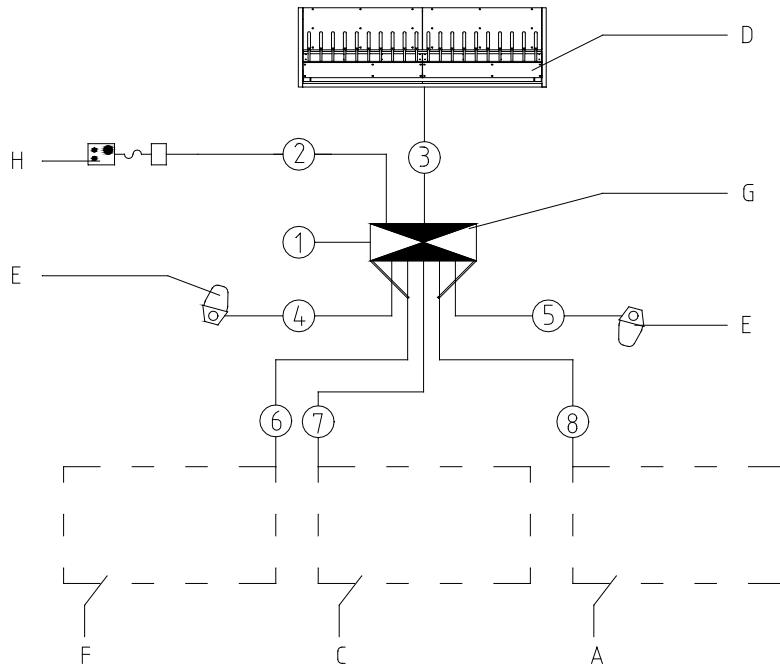


#### Note:

If the hydraulic unit is installed in a mechanical room with the controllers, an installation cabinet (G) is not used.

### 10.3 Cable diagram Tyre-Killer TK

The figure shows the standard cabling diagram for the Tyre-Killer TK installation. The table below shows the cables that are used.

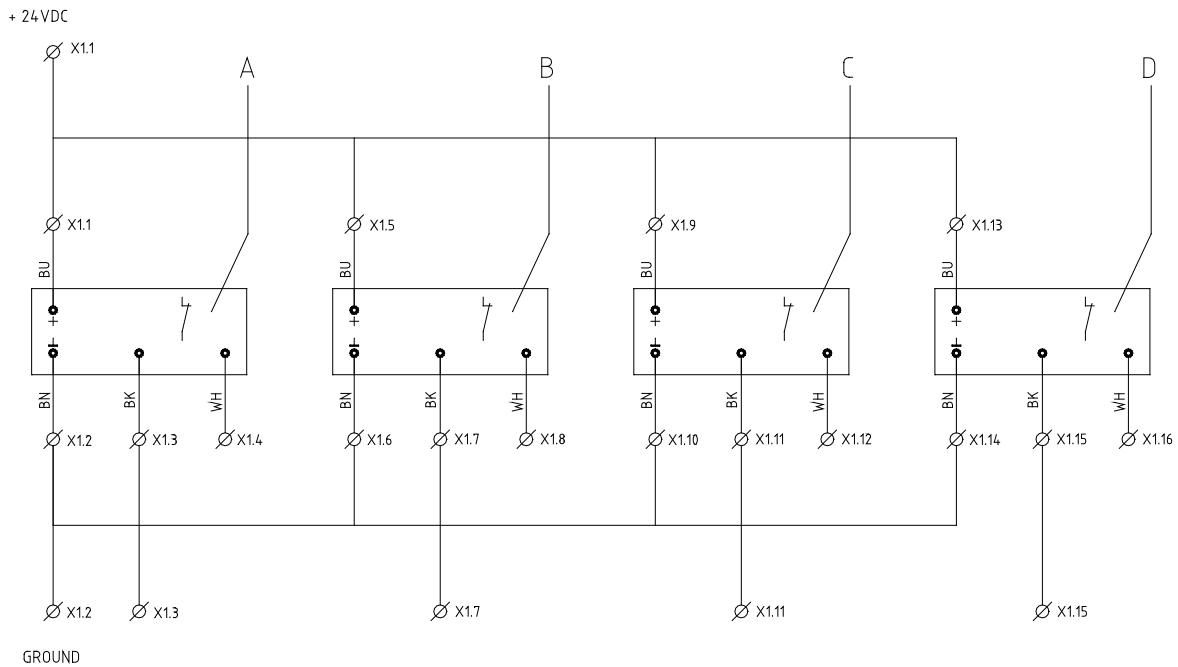


#### Cables and hoses for Tyre-Killer TK controller:

Pos.	Cable type	From	To	Function
1.	Power cable – armoured, with tinned copper ground wire, 5 conductors, 2.5 mm <sup>2</sup> (12 AWG)	Power supply	Controller	3phase=neutral+ground
2.	Signal cable – armoured and shielded, 5 twisted pairs, 0.8 mm <sup>2</sup> (18 AWG)	Controller	Push-button cabinet	Operation
3.	Hydraulic hose 3/8"	Hydraulic unit	Tyre-Killer TK	Obstacle up
	Hydraulic hose 3/8"	Hydraulic unit	Tyre-Killer TK	Obstacle down
	Hydraulic hose 3/8"	Hydraulic unit	Tyre-Killer TK	Obstacle: unlock
	Hydraulic hose 3/8"	Hydraulic unit	Tyre-Killer TK	Obstacle: lock
	Signal cable, armoured and shielded, 3 twisted pairs, 0.8 mm <sup>2</sup> (18 AWG)	Controller	Tyre-Killer TK	Approach switches (4x)
4.	Power cable – armoured, with tinned copper ground wire, 3 conductors, 1.5 mm <sup>2</sup> (14 AWG)	Controller	Traffic light	Red / green
5.	Power cable – armoured, with tinned copper ground wire, 3 conductors, 1.5 mm <sup>2</sup> (14 AWG)	Controller	Traffic light	Red / green
6.	Signal cable – armoured and shielded, 1 twisted pair, 0.8 mm <sup>2</sup> (18 AWG)	Controller	Detection loop	Closed safety detection loop
7.	Signal cable – armoured and shielded, 1 twisted pair, 0.8 mm <sup>2</sup> (18 AWG)	Controller	Detection loop	Closed safety detection loop
8.	Signal cable – armoured and shielded, 1 twisted pair, 0.8 mm <sup>2</sup> (18 AWG)	Controller	Detection loop	Auto exit detection loop

## 10.4 Electrical diagram Tyre-Killer TK

The drawing below shows the electrical diagram of the Tyre-Killer TK with Mechanical Lock.



### Limit switches in the Tyre-Killer TK:

Code	Function
A	Limit switch Down.
B	Limit switch Up.
C	Limit switch Unlocked.
D	Limit switch Locked.

### Wire colour coding:

Code	Wire colour
BU	Blue
BN	Brown
BK	Black
WH	White

## 11 CONNECTION OF THE TYRE-KILLER TK

This chapter describes how the Tyre-Killer TK should be connected electrically and hydraulically.

### 11.1 Electrical connections

- Connect the controller cable to connection strip 'X1' of the Tyre-Killer TK according to the table below. Thereafter, check the connections carefully.

#### **Electrical connections:**

Terminal	Function
X1.1	Feed voltage +24 VDC
X1.2	Ground
X1.3	Obstacledown(Contactproximity switch Down)
X1.7	Obstacleup(Contactproximity switch Up)
X1.11	ObstacleUnlocked(Contactproximity switch Unlocked)
X1.15	ObstacleLocked(Contactproximity switch Locked)

### 11.2 Placing and connecting the controller box

The placement and connection of the controllers and the push button panel depends on the chosen installation and the control. The installation thereof is given in the accompanying documentation.

### 11.3 Hydraulic connections

#### **Danger**

- During connection of the hydraulic hoses, the hoses MUST NOT be under pressure.
- The electrical mains power must be switched off.

#### **Warning**

When working with hydraulic systems be extremely clean: sand and other contaminants can lead to failures and excessive wear of the system.

#### **Warning**

Ensure that the oil tank is always full.



#### **11.3.1 Bleeding air from the hydraulic hoses of the lift**



#### **Note**

For air bleeding, see also the user manual for the hydraulic drive unit.

- Connect the hydraulic hoses of the lift (in the Tyre-Killer TK) to one another.
- Connect the outlets of the hydraulic drive unit together.



#### **Careful**

The hydraulic hoses supplied by Pevac are already filled with hydraulic oil. For this reason fasten the hoses well, so that no oil can escape from the hoses, which would cause difficulty in the bleeding of air.

- Open the lift valve.
- Let the pump turn for approximately 10 minutes so that all the air is forced out of the hoses.
- Stop the pump and set the power off.
- Loosen the hoses of the Tyre-Killer TK from one another.
  - In order to detach the hoses, the ring of the quick-coupling must be retracted.

#### **11.3.2 Bleeding air from the hydraulic hoses of the mechanical lock**

Perform this procedure now for the hydraulic hoses of the mechanical lock:

- Attach the ends of the hoses (in the Tyre-Killer TK) together.
- Connect the outlets of the hydraulic drive unit together.
- Open the valve for the mechanical lock.
- Let the pump turn for approximately 10 minutes so that all the air is forced out of the hoses.
- Stop the pump and set the power off.
- Loosen the hoses of the Tyre-Killer TK from one another.
  - In order to detach the hoses, the ring of the quick-coupling must be retracted.

### 11.3.3 Hydraulic connections Tyre-Killer TK

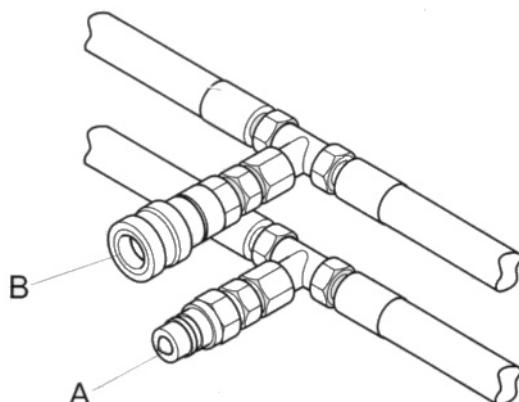
If the hydraulic hoses are free of air, the Tyre-Killer TK can be connected as follows:

- Connect the hoses to the quickconnectors on the T-pieces in the Tyre-Killer TK.
- Loosen the swivel couplings on the top of the cylinders (as a rule, it is sufficient to loosen the couplings two turns).



#### Careful

The screw threads in the hydraulic cylinders must not be damaged!



- Let the obstacle rise to remove all of the air from the cylinders. By preference, use the hand pump (if present) to do this.
- Re-tighten the swivel couplings on the top of the cylinders.
- Allow the obstacle to fall.
- Check the oil level once again.

#### Connection of the mechanical lock in the Tyre-Killer TK:

Pos.	Connection type	Function
A.	Male	Lock
B.	Female	Unlock

#### Connections for the Tyre-Killer TK:

Pos.	Connection type	Function
A.	Male	Obstacle up
B.	Female	Obstacle down

### 11.3.4 Hydraulic connections mechanical lock (option)

If the Tyre-Killer TK is connected, see § 11.2.2, the mechanical lock can be connected as follows:

- Connect the hoses to the quick-connectors mounted in the middle section of the Tyre-Killer TK.
- Let the mechanical lock retract and then extend.
- Check the oil level.

## 12 COMMISSIONING



### Danger

Before the Tyre-Killer TK is tested:

- There can be no cars on or in the vicinity of the Tyre-Killer TK;
- The Tyre-Killer TK must be cleared of obstacles, such as materials that have been used for the assembly;
- Personnel must be out of the vicinity of the Tyre-Killer TK.

The operation/functioning of the Tyre-killer TK is as follows:

### 12.1 Function for switches

In the following description, the functions of the valves and proximity switches refer to their functions. The following names are used:

Type of detector	Name	Function
Proximity switch	Limit switch down	Detects lowest position of the obstacle
	Limit switch up	Detects uppermost position of the obstacle
	Limit switch unlocked	Detects the "unlocked" position of the mechanical lock
	Limit switch locked	Detects the "locked" position of the mechanical lock
Valve	Valve down	Lowering of the obstacle
	Valve up	Raising of the obstacle
	Valve unlock	Unlocking of the obstacle
	Valve lock	Locking of the obstacle
Pressure switch	Pressure switch	Detect maximum hydraulic pressure in the hydraulic system caused by reaching a mechanical endpoint or blocking of the obstacle

## 12.2 Preventing access

- Push the button: "Obstacle up": The motor of the hydraulic drive unit is engaged and the valve UP is opened. This allows pressure into the hydraulic cylinders that causes the obstacle to rise.
- If the obstacle is in the highest position, limit switch UP detects this condition.
- If the obstacle is prevented from moving higher, the pressure in the hydraulic system rises and the pressure switch is activated.
- A combination of limit switch UP and the pressure switch ensures that valve UP closes.
- The valve LOCK will now be activated, causing the cylinder of the mechanical lock to extend (lock the obstacle).
- If the cylinder of the mechanical lock is completely extended, the limit switch LOCKED detects this condition. A combination of limit switch LOCKED and the pressure switch ensures that valve LOCK closes.
- The valve LOCK returns to the rest position and the motor is switched off.

The entrance is now blocked.

## 12.3 Permitting access

- Push the button: "Obstacle down": The motor of the hydraulic drive unit is engaged and the valve UP is briefly opened. This causes the obstacle to move completely upward allowing the mechanical lock to slide.
- The valve UP is closed and the valve UNLOCK is opened. This causes pressure in the hydraulic cylinder that causes the mechanical lock to retract.
- If the mechanical lock is completely retracted, the limit switch UNLOCKED detects this condition. The valve UNLOCKED is now closed and the valve DOWN is opened. This allows pressure into the hydraulic cylinders that causes the obstacle to lower.

- If the obstacle is in the lowest position, limit switch DOWN detects this condition. A combination of the limit switch and the pressure switch ensure that the contact is broken, causing the valve DOWN to return to the rest position and the motor to be switched off.

The passage is now clear.



### Note:

For the specific operation and the customer adapted controller panel, see the separate user manual for the customer adapted Tyre-Killer TK.



### Note:

The operation of the Tyre-Killer TK is the same as the hydraulic diagram.

## 12.4 Checking the operation

- Check all hydraulic connections for leaks:
  - During movement of the obstacle;
  - When the Tyre-Killer TK is up;
  - When the Tyre-Killer TK is down.
- Check if the proximity switches detect in the correct position.
- Check if all signals of the electronic system function.
- Check that the Tyre-Killer TK is functioning properly after installation.

## 12.5 Final assembly

- Fill the connection cabinet in the Tyre-Killer with removable, flexible epoxy resin (3M GELLA 4441 or equivalent).
- Fit the Tyre-Killer TK cover plates. Lock the bolts with Loctite 270.
- Fill up the wall feed-through with PUR foam.



### Note:

This is only appropriate if the hydraulic unit is installed in a separate room and not in an installation cabinet.

The Tyre-Killer TK is now ready for use.

## 13 GENERAL INSPECTION AND MAINTENANCE



### Warning

When working on the Tyre-Killer TK, disconnect the mains power!



### Warning

When working on the Tyre-Killer TK, close off the hydraulic pressure.

To guarantee the safety and the proper functioning of the Tyre-Killer TK, maintenance by Pevac B.V. qualified personnel is necessary.



### Note

See the Pevac B.V. maintenance book for the first maintenance.

### 13.1 Service intervals

For the first time: **A month** after installation.

After that: **Three months** after installation.

Consequently every: **Six months**.

Work to be carried out:

- General visual check.
- Cleaning the Tyre-Killer TK and the mechanism.
- Lubrication of the cylinder eyes.
- Checking the attachment of bolts and nuts, specifically those of turning elements.
- Checking the hinges of the obstacle for play and, as necessary, replacing the plastic coating.
- Updating the Pevac B.V. log card. On this card, the corrective measures should also be recorded.
- If the log card is full, please send it to Pevac B.V. in Zevenhuizen. You will then receive a new log card by return mail.

## 14 THE TYRE-KILLER TK AND THE ENVIRONMENT

Through the use of biodegradable hydraulic oil, the environmental impact can be reduced.

Take care, nonetheless, that in the case of leakage the oil cannot enter the environment directly. The use of an oil-leak pan in the installation cabinet can prevent this from occurring.

The installed hydraulic drive is equipped with an electronic level detector. This allows early detection of any possible leakage so that measures can be taken in a timely manner. In addition, the hydraulic tank is provided with a sight glass. This permits checking of the oil level.

### 14.1 End of life span

The Pevac B.V. Tyre-Killer TK can have a technical life span of 15 years under normal circumstances, with normal use and good maintenance.



### Environment

At the end of the life span the Tyre-Killer TK should be disposed of as follows.

Part	Manner of processing
Frame	Scrap
Obstacle	Scrap
Drive	Revision
Hydraulic oil	Chemical waste
Plastic parts	Container for plastic
Electrical components	Special recycling companies
Remains	Scrap